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ABSTRACT

The study involving 20 learning disabled (LD) and 20 normal Js at the fourth, seventh, and tenth grade levels was conducted to determine if normal and LD students differ in reading flexibility. To measure reading flexibility, the dependent variables--elapsed time and comprehension--were assessed under two conditions. For Condition 1, Ss were asked to read passages to answer a general comprehension question; under Condition 2, Ss were asked to read passages to answer a specific comprehension question posed prior to the reading activity. Results suggested that normal students demonstrated reading flexibility at each grade level. Speed was varied as appropriate to the reading purpose, and comprehension was measured at an acceptable level. However, the degree of reading flexibility demonstrated was considered to be at a very low level of development, and no indication of maturation of this skill was apparent across grades. Results from LD students indicated that LD Ss were not characterized by reading flexibility at any of the three grades. Further, these students demonstrated a trend toward decrease in flexible reading skills across grades. The normal group consistently demonstrated faster reading speeds and better comprehension than the LD group at all three grade levels. (SB)

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Reading Flexibility of Learning Disabled and Normal Children
at Three Grade Levels

Reading difficulties represent the most prevalent academic problem demonstrated among learning disabled students (McNutt, 1980; Mercer, 1979). Kaluger and Kolson (1978) reported that an estimated 80% to 90% of all referrals for learning disability services are based on observed reading deficiencies. Although much time and energy has been invested in attempting to explain the reading process, little agreement exists regarding the components of the reading process or the process of acquiring efficient reading skills. While much attention has been devoted to the disabled reader, Smith (1978) suggested that a more thorough investigation of the skills of efficient readers would allow better understanding of the reading process.

Most conceptualizations of the proficient reader suggest that he is characterized by a high degree of reading flexibility (Samuels & Dahl, 1975; Golinkoff, 1975-76; Hoffman, 1979). Furr (1970) analyzed the skills of advanced readers and found that they demonstrated a variety of reading skills and used them as appropriate to the reading task. He described these mature, efficient readers as flexible, able to adjust both rate and method to their specific purpose for reading.

Research has indicated that reading flexibility is a very complex behavioral phenomenon (Furr, 1970). No one entity exists which can be said to represent reading flexibility; there are instead several theoret-

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ical conceptualizations of the skill (Hoffman, 1978). Rankin (1974) concluded that most definitions agree on the following:

Reading flexibility reflects the ability of a reader to change some aspects of his reading skills in order to attain a variety of reading purposes or to read different kinds of materials with good comprehension. The purposes assumed in most definitions involved different aspects of comprehension. Most definitions also include some reference to the adjustment of rate in an efficient manner suitable to the reading task. (p. 37).

As noted in Rankin's summary, the major factor in reading flexibility is the effect of a change in purpose for reading on the student's rate of reading and comprehension.

The importance of developing efficient, flexible reading skills is widely accepted (Miller, 1976). However, Smith (1978) suggested that researchers know very little about the developed skills of fluent readers or the end products of reading instruction, much less about the process of acquiring those skills. For these reasons, investigations delineating the skills characteristic of efficient readers and studies discerning the differences between proficient and disabled readers deserve primary attention in educational research.

Several reading authorities have proposed distinctions between efficient and inefficient readers in terms of comprehension. Goodman (1976) proposed that the efficient reader gets meaning by selecting the fewest, most productive graphic and syntactic cues required to make accurate guesses regarding content and meaning. Similarly, Willows

(1974) suggested that fluent readers pay attention to the information in print that is most relevant to their purpose for reading or in order to answer the specific question being asked. Good readers seem to use a scan-for-meaning approach which they apply flexibly to suit varied purposes for reading (Golinkoff, 1975-76).

In contrast, inefficient readers are said to allow print to impede their comprehension (Watson, 1973). Teachers observe that students who decode words laboriously during reading often fail to understand the meaning of what they are reading (Dahl, 1979). Golinkoff (1975-76) indicated that poor readers tend to read in a word-by-word manner. She concluded that readers characterized by inadequate comprehension abilities fail to organize the content of the text meaningfully and become slaves to the actual printed word. Similarly, research by Cromer (1968) and Steiner, Weiner, and Cromer (1971) indicated that poor readers treat words as unrelated items in a series and fail to use syntactical clues to obtain meaning.

Differences between efficient readers and learning disabled students have also been discussed in terms of rate. It is generally accepted that a minimum rate of reading is an important factor in skill of comprehension. In order not to exceed short-term memory limits, speed seems to be essential for comprehension (Dahl, 1979). Thus it has been found repeatedly that skilled comprehenders are faster readers than are less skilled comprehenders (LaBerge & Samuels, 1974). Poor readers are said to read slower than good readers; this slow processing of words is proposed to cause the reader to forget previous words before new

words are processed, thereby making comprehension difficult (Mackworth, 1972; Berger, 1973). Other reading authorities have suggested that poor readers do not demonstrate the ability to vary their reading rates (Gibson & Levin, 1975; Golinkoff, 1975-76; Spache, 1976). Cooper and Petrosky (1976) reported that good readers shift approaches according to the purpose for reading. Junior-high students who exhibited an extensive range of reading behaviors and could select those appropriate for a given purpose in reading were found to be more successful readers (Ngandu, 1977). In summary, efficient and inefficient readers are often distinguished by reading flexibility, as shown by the ability of the efficient reader to read at a rate which allows fast, efficient comprehension appropriate to the specific purpose for reading.

A few attempts have been made to measure the prevalence of reading flexibility among school-age and college students. McDonald (1966) and research reported by Farr (1969) suggested that the majority of readers do not demonstrate reading flexibility while Samuels and Dahl (1975) found that students did demonstrate reading flexibility.

Conflicting results obtained from reading flexibility investigations have stimulated criticism regarding various aspects of the methodology employed. Criticism has focused primarily on the failure of a method to establish discernibly different purposes for reading (Samuels & Dahl, 1975; Frase, 1977) and on the inappropriate methods used to measure rate (Converse, 1978). McDonald (1966) further suggested that the reading passages utilized should be of adequate length to establish reliability and validity; he also suggested that the methods should include a

measure providing evidence that the purposes established for reading the various passages have been accomplished. The use of group comparisons to establish reading flexibility was criticized by Samuels and Dahl (1975). They contended that reading flexibility can only be demonstrated when the same individual shows different reading rates under different conditions.

Farr (1969) suggested that the lack of measurable reading flexibility in large numbers of students should not be totally attributed to poor measurement devices. He suggested that the reading curricula in schools actually develop inflexible readers. Hoffman (1979) also indicated that most reading instruction teaches students that the primary and fixed purpose for reading is to proceed in a cumulative word-by-word manner until the author's meaning can be accurately reconstructed.

In summary, review of the literature reveals a widespread belief that efficient readers are characterized by reading flexibility. Flexibility as reviewed here is: the ability to change reading rate according to the purpose for reading while maintaining adequate comprehension. Another implication of this review is that the reading curriculum employed for children may have an effect upon reading flexibility. No research was found which specifically measured the existence of reading flexibility among learning disabled students.

The purpose of this investigation was to ascertain if learning disabled and normal youngsters differ in reading flexibility and to determine if these differences tend to change across grade levels. Two questions guided inquiry in this study:

- (1) How do learning disabled and normal students compare in their tendency to modify reading rate as the purpose for reading is changed?
- (2) How do learning disabled and normal students compare in reading comprehension as the purpose for reading is changed?

METHOD

Subjects

A sample of 120 subjects was selected from schools in the Jefferson County School System located around Birmingham, Alabama. Nine schools were selected with the use of a random numbers table (Ferguson, 1976) from a list of those in the system having teachers certified in learning disabilities and providing services to learning disabled students in the fourth, seventh, or tenth grades. Several schools in the system were omitted because they did not meet one or both of these requirements. Three schools were used to obtain the sample of fourth-grade subjects ($N=40$); three schools were used to obtain the sample of seventh-grade subjects ($N=40$); and three schools were used to obtain the sample of tenth-grade subjects ($N=40$). The schools included in the study represented various socio-economic populations and geographic locations in the county.

The sample was composed of normal and learning disabled students placed in the fourth, seventh, and tenth grades. Twenty students enrolled in a learning disabilities resource program (learning disabled) and twenty students enrolled in regular education only (normal) were included at each grade level. The learning disabled ($N=60$) students selected for inclusion in the study were identified and placed by the

Jefferson County Eligibility Committee according to the definition and procedures required by the Alabama State Department of Education (Policies and Procedures Manual, 1979). The procedures were based on the regulations published in the Federal Register of Thursday, December 29, 1977. Specifically, the learning disabled students in this study had to exhibit a significant discrepancy between expected achievement and actual achievement in the area of reading.

The present levels of reading achievement were measured by the learning disabilities teachers using the Sucher-Allred Reading Placement Inventory (Sucher & Allred, 1973), an individually administered oral reading test. Students were not excluded from the study if they manifested difficulties in other academic subjects as well as reading. In order to ensure that each learning disabled subject could adequately read the test passages, it was further required that fourth-grade subjects exhibit a minimum reading comprehension on the first-grade level, that seventh-grade subjects exhibit a minimum reading comprehension at the second-grade level, and that tenth-grade subjects exhibit a minimum reading comprehension on the third-grade level. This information was obtained from the classroom teacher and was based on the results of the Sucher-Allred Reading Placement Inventory (Sucher & Allred, 1973). Five additional learning disabled students were excluded from the study due to an inability to read at the minimum level required for the experimental passages.

The normal subjects ($N=60$) were selected in essentially the same manner as were learning disabled subjects with advanced and remedial

students being excluded from the sample. All subjects were selected at random. Normal students at each grade level were required to demonstrate minimal reading levels. Each fourth-grade subject was required to read at a minimum of third-grade level; each seventh-grade subject had to read at a minimum of sixth-grade level; and each tenth-grade subject was required to read at a minimum of eighth-grade level. This was measured by requiring each subject to read the appropriate word list from the Slosson Oral Reading Test (Slosson, 1963) with a minimum of 80% accuracy.

Table 1 describes the break out by grade of selected subjects.

Insert Table 1 about here

Instrumentation

For the purpose of this study the concept of reading flexibility was defined as the ability of the reader to change the time allotted to a reading task as appropriate to attain various purposes for reading while maintaining adequate comprehension. Techniques designed to measure reading flexibility included a measure of the elapsed time during silent reading tasks and a measure of comprehension of the selections read.

Silent reading comprehension. The reading selections used in the study were based on portions of stories from the Guided Reading Study guide, a component of the Critical Reading and Listening Program published by Instructional/Communications Technology, Inc. (1974). Readability levels used in the study were standardized for each grade

level using the Fry Readability Graph (Fry, 1977). To control for interest level, reading passages for each of the three grade levels were selected from this series out of the set of Mystery and Adventure Workbooks. Using this set of stories and the Fry Readability Formula (Fry, 1977), 10 selections were chosen at each grade level. Stories for fourth-grade subjects were selected on a second-grade readability level; stories for seventh-grade subjects were selected on a third-grade readability level. To control for order effect, stories were assigned to either Condition 1 (C_1) or Condition 2 (C_2) presentations with the use of random numbers table (Ferguson, 1976). Five reading passages were selected for presentation under Condition 1 and five for presentation under Condition 2. In addition, the order of presentation of the five passages within each condition was determined through the use of a random numbers table (Ferguson, 1976). A descriptive summary of the two experimental conditions is located in Table 2.

Insert Table 2 about here

Comprehension questions to be asked orally at the end of each reading task and requiring an oral response from the subjects were designed by the investigator. Each of the reading passages contained 22 lines of script; the lines were divided into clusters of 1-5, 6-9, 10-13, 14-18, and 19-22. The same order was used to design the questions for each of the conditions so that under each condition for any grade level the answers to each of the five questions was found in approximately the same portion of the script. The questions designed

for the study were reviewed by two independent observers for clarity. In addition, a small number of students at each grade level who were not included in the experiment were asked to read the selections and answer the questions. As a result, minor revisions in wording were made, and the questions were then administered to a second group of students. On the second presentation the questions were answered correctly by the students with no difficulty noted. Each of the questions involved literal comprehension skills which, according to taxonomy of cognitive and affective dimensions of reading comprehension by Barrett (1979), require recall of ideas and information explicitly stated in the reading selection.

Although each of the 10 reading passages and comprehension questions developed for each grade level was matched for difficulty level, the pre-reading instruction for the two conditions in the study was different. The subjects were given one purpose for reading the five selections in Condition 1 and a different purpose for reading the five selections in Condition 2. In Condition 1 the student was asked to read each of the five selections in order to answer a general comprehension question regarding its contents. This comprehension task closely resembled the typical classroom activity involving reading for content. In the second condition, the students was asked to read each of the five selections to answer a specific question from the content of the passage; the question to be answered for Condition 2 was posed each time prior to the silent reading task. This type of reading comprehension approximated that of skimming activity.

The students' responses were recorded and later scored by three independent raters; each rater assigned a response a value of 0 if totally incorrect, 1 if partially correct, or 2 if totally correct. The scores assigned to each response by each of the three raters were summed across the five questions for each condition to obtain a total score of Condition 1 (0-10) and Condition 2 (0-10) from each rater. The total scores assigned by each of the three raters for each condition were then summed to obtain a total comprehension score for each condition (range of 0-30) and were used to analyze the dependent variable, comprehension, across the two conditions.

Silent reading elapsed time. The selections to be read by the students in the study were presented in a standard format through the use of the Apple II Micro-Processor (Apple, 1978). The Micro-Processor was programmed to make a full-screen presentation containing the portions of reading selections as previously described. The process was repeated until five screen presentations were programmed for each of the two experimental conditions. The screen of the Micro-Processor displayed 880 characters (22 lines, 40 characters per line). Therefore, each screen presentation held a maximum of 176 five-character units (including letters, numbers, or spaces). The five-character unit was used to represent one word in order to control the variance in word size. Each screen presentation had a standardized format with regard to size of print, spacing between lines, margins, and number of five-character units presented, providing experimental control over stimulus presentation. In addition, a small number of students at each grade

level who were not included in the experiment were asked to read the 10 selections under the same experimental condition to verify that the selections would be read with the same amount of elapsed time under one condition. For this test the students were asked the comprehension questions at the end of the reading task only for each of the 10 screen presentations as in procedures for Condition 1. These data supported the assumption that the selections were matched for difficulty across the conditions and under the same conditions would be read in matched periods of elapsed time.

The Micro-Processor was also programmed to record elapsed time during each single screen presentation. The time clock was activated by the student as he pressed the space bar to begin reading. When the student completed the reading assignment, he pressed the space bar to clear the screen; this deactivated the time clock and indicated that the students was ready for the comprehension question. The computer then displayed the elapsed time during that screen presentation by that particular student. The elapsed time was recorded by the investigator after each reading under both conditions. To obtain the score used to denote elapsed time for each condition, the investigator eliminated the highest and lowest elapsed times of the three remaining screen presentations. This was calculated under each experimental condition to obtain the elapsed time data for Condition 1 and Condition 2. These elapsed time data were used to analyze the dependent variable, elapsed time, across the two conditions.

Procedures

Procedures used to collect the data were identical for the fourth, seventh, and tenth-grade subjects including the learning disabled and normal samples. Each student was taken to the location of the Micro-Processor and asked to sit facing the television screen. The following general introductions were given to each student:

The screen of the computer is going to present parts of stories for you to read. If you do not know a word, just keep on reading. When you have finished reading, I will ask you a question about what you have read. You will press the space bar to have your story appear on the screen again when you are ready to answer the question.

After the general introduction, procedures during data collection were designed to be different during Condition 1 and Condition 2. The following is a description of procedures specific to each condition.

Condition 1. The first five reading tasks constituted Condition 1 of the study. Before each of the five reading selections was accessed by the student, the following directions were given:

Remember, press the space bar when you are ready to begin reading; this activates the computer and the reading material will be displayed on the screen. When you are ready to answer a question about what you have read, press the space bar again to clear the screen. If you have no questions, you may press the space bar, now, to begin.

After the student cleared each screen presentation, indicating that he was ready for a question regarding its contents, the examiner asked the subject the question developed for that reading passage. The subject's responses were recorded on the protocol to be scored at a later time. Before proceeding to the next reading task, the examiner also recorded elapsed time for that reading task as indicated by the computer.

Condition 2. The second five reading tasks constituted Condition 2 of the study. Before each reading selection was accessed by the student, he or she was given a specific comprehension question to be answered. The directions given to the students before each of the five readings tasks were:

Read this story to find out (insert appropriate question).

Press the space bar when you are ready to answer the question.

Press the space bar now to begin reading.

When the screen was cleared by the student, the examiner asked the question posed prior to the reading task. The subject's response to the question was recorded as well as the elapsed time displayed by the computer.

Results and Discussion

The most meaningful measures of reading flexibility include comprehension and speed when reading for a specific purpose (McDonald, 1966; Farr, 1969). As this statement implies, a discussion of reading flexibility should consider reading speed and comprehension in combination, indicating the extent to which these two variables change as the purpose

for reading is manipulated. For this reason the following report and discussion of the results of this investigation will address the effects of the change in reading purpose imposed between Condition 1 and Condition 2 on both of the dependent variables. These variables, elapsed time and comprehension, will be considered in combination.

Both analysis of variance and regression analyses were utilized in the study. The analysis of variance technique employed was for a two-factor experiment with repeated measures on one factor (Ferguson, 1976). This analysis was repeated at fourth, seventh, and tenth grades. Regression analyses were applied across grade levels to compare normal and learning disabled students in terms of their difference in elapsed time between Condition 1 and Condition 2 and their difference in comprehension between the two Conditions. These differences (comprehension and elapsed time) between Conditions 1 and 2 were regressed on group (learning disabled and normal) grade level (fourth, seventh, and tenth) and their interaction. All of the data were analyzed using the Statistical Analysis System (SAS) version 79.2, (Barr, Goodnight, Sall, Chilko, and Blair, 1979).

Identification of Reading Flexibility

As shown in Tables, 3, 4, 5, and 6, the analysis of variance procedures on elapsed time and comprehension data indicate that both normal and learning disabled groups demonstrated flexible reading skills at grade four. The elapsed time scores decreased for both groups under Condition 2, while the comprehension scores increased under Condition 2. These results indicate that as each group increased its reading speed

the students were less likely to make errors in comprehension. The normal group demonstrated ability to read at significantly faster rates than the learning disabled group across both conditions. Under Condition 2 the normal group exhibited 96% accuracy in comprehension, while the learning disabled group demonstrated 73% accuracy. The overall difference between the two groups accounted for more of the total variability than did the difference between conditions. The analysis indicated that the difference between conditions for the two groups had little practical significance.

Insert Tables 3, 4, 5, and 6 about here

The normal and learning disabled students in grade seven also demonstrated flexible reading skills (see Tables 7, 8, 9, and 10). Both groups reduced their reading time under Condition 2 and maintained their comprehension across conditions. At this grade normal students read selections under both conditions at a speed significantly faster than the learning disabled group. However, no significant difference was noted between the two groups in comprehension scores. Again, for the elapsed time variable, the difference between the two groups accounted for more of the variability, while the practical significance of the difference between the two conditions was minimal. An examination of the accuracy of the groups on comprehension under Condition 2 indicated that the normal group scored 89% accuracy while the learning disabled group demonstrated 78% accuracy.

Insert Tables 7, 8, 9, and 10 about here

As depicted in Tables 11, 12, 13, and 14, the results for grade 10 indicated that the normal students demonstrated flexibility in reading while the learning disabled students did not. The normal students demonstrated a reduction in elapsed time under Condition 2 and an increase in comprehension scores. The learning disabled group did not reduce their reading speed significantly between the two conditions, although their comprehension did increase significantly. No significant difference in comprehension between the two groups was noted. However, the learning disabled group exhibited 86% accuracy in comprehension under Condition 2, while the normal group exhibited 98% accuracy. Inspection of the elapsed time data indicated that the simple effects reflecting the difference between groups at each condition account for more variability than did the simple effects for condition, which were significantly only for the normal group.

Insert Tables 11, 12, 13, and 14 about here

Throughout the analysis of variance procedures, the difference between normal and learning disabled groups on the two variables accounted for more of the variability than differences between the conditions. At each grade level the groups were found to be significantly different on elapsed time measures. Significant differences between the groups in comprehension were obtained at fourth grade, but no significant dif-

ferences were noted at seventh and tenth grades, even though tendencies toward significance were noted. These results are similar to the differences between good and poor readers which were noted in the review of the literature. Skilled comprehenders (LaBerge & Samuels, 1974). Just as Goodman (1976) described efficient readers, the readers in the normal group apparently selected fewer, more productive cues which were utilized to make accurate guesses regarding content and meaning. The mean accuracy of the comprehension scores for the normal group was 96% at the fourth grade, 89% at the seventh grade, and 98% at the tenth grade. These high accuracy levels also support research by Cooper and Petrosky (1976) and theories of Smith (1979) regarding the positive effects of reading speed on comprehension. The ceiling effect caused by the number of normal students scoring at the upper limit of 30 possible points per condition most likely reduced the differences between the two groups.

Learning disabled students demonstrated a tendency to perform as poor readers have been described in the literature. Poor readers are considered slower than good readers (Mackworth, 1972; Berger, 1973) and generally do not comprehend as well (Cromer, 1968). Watson (1973) suggested that poor readers are overly dependent on print and this dependency impedes their progress. The poor comprehension scores of the learning disabled sample were demonstrated by the mean scores for the lowest and middle grade levels (4th grade = 73%; 7th grade = 78%). These low comprehension scores suggest that the learning disabled students often treated words as unrelated items, failed to use syntactic or

contextual clues in the material (Steiner et al., 1971), and failed to organize the test for meaning (Golinkoff, 1975-76).

The slow reading speed of the learning disabled group is most likely a factor contributing to their demonstration of poor comprehension skills. Theories of Mackworth (1972) and Berger (1973) suggest that slow word processing interferes with the cumulative memory of word meanings. An explanation of LaBerge and Samuels (1974) and Dahl (1979) indicated that the majority of the reader's capacity for attention is demanded by the process of decoding each word, so the reader's capacity for attention to meaning is minimal if attention is demanded for the decoding process.

Harris and Sipay (1979) suggested that the degree of the relationship between rate and comprehension varies with age and is strongest in the elementary grades. Support for this statement is found in these fourth-grade data, which demonstrated the strongest relationship in which the increase in reading speed was accompanied by an increase in comprehension scores. These results indicated that, when the learning disabled group reduced their mean elapsed time by 25.16 seconds under Condition 2, their mean comprehension score increased from 65% to 73%. When the normal fourth-grade students reduced their elapsed time by 16.38 seconds, their comprehension scores increased from 82% to 96%. This strong positive relationship between rate and comprehension was not observed for the learning disabled group at the seventh-grade level. As these students reduced their elapsed time by 14.95 seconds, their comprehension showed a slight decrease. This was the only instance in

which the increase in reading speed did not result in a measurable increase in comprehension.

Harris and Sipay (1979) suggested that often readers will vary their rate of reading in order to maintain adequate comprehension. This statement could explain the reading behavior of the tenth-grade learning disabled students; these students reduced their elapsed time by only 2.38 seconds under Condition 2, and demonstrated no significant difference in elapsed time between conditions. In addition, this was the only instance in which the comprehension scores of a learning disabled group were observed above 80%. Application of Spache's (1976) theory would suggest that the tenth-grade learning disabled students employed a reading speed which allowed them to effectively accomplish their purpose for reading. Goodman (1976) would contend that this reading behavior could only be described as effective, as opposed to being efficient or flexible.

In addition to the relationships between rate and comprehension which were demonstrated in this investigation, relationships between rate, comprehension, and the manipulation of the purpose for reading were observed. In examining the effect that establishing a specific purpose for reading had on this sample, both groups at grades four and ten and the normal group at grade seven increased their comprehension under Condition 2, in which a specific purpose was given for reading. These results support the theory proposed by Frase (1977), which suggested that recall will be aided if the purpose for reading is specific and provides direct cues.

The results of this investigation conflict with the research summaries of Hansen (1979) which suggested that comprehension was not aided by posing specific content-related pre-reading questions. However, Hansen did note that the negative results she reported could be due to age, precision of the measuring instruments, or the type of purpose given for reading. The results also conflict in part with those of Grant and Hall (1967), which indicated that average readers would benefit from purpose-setting while low-reading-ability students would be adversely affected.

The only age and ability level not demonstrating the positive effects of purpose-setting in this investigation was the seventh-grade learning disabled group.

The results of the data for both groups at grade four, both groups at grade seven, and the normal group at grade ten demonstrate that when specific purposes were given for reading, the rate of the groups was adjusted according to purpose. These results are similar to those obtained by Samuels and Dahl (1975), in which fourth-grade and college students adjusted their rates appropriately according to the assigned purpose. The tenth-grade learning disabled group was the only group which did not reduce their rate significantly when asked to read for the purpose of locating a specific fact.

In summary, the normal students were characterized by reading flexibility at each of the three grade levels. These students varied their reading speed according to their purpose for reading. The speed utilized was at a rate which allowed fast, efficient comprehension

appropriate to the specific purpose. Comprehension was demonstrated at an accuracy level of 80% or above at each grade level. However, it should be noted that the low levels of practical significance which resulted between conditions suggest that the degree of reading flexibility demonstrated is at a very low level of development. Fry's (1978) criteria suggest that reading flexibility is adequately demonstrated when a reader's rapid reading rate for skimming is twice as fast as his average reading rate. None of the groups of normal students demonstrated reading flexibility at this level of efficiency.

An overview of the reading behaviors demonstrated by the learning disabled sample is subject to various interpretations. At fourth and seventh grades, the learning disabled group reduced their elapsed time and increased or maintained their comprehension when given a specific purpose for reading. This behavior meets the criterion for reading flexibility implied in the definitions which indicate that phenomenon is demonstrated when the reader adjusts his rate according to the nature of the reading situation (Levin, 1968; Furr, 1970; Carillo, 1973). However, definitions proposed by others indicate that the degree of accuracy of comprehension is critical to the definition (Braam, 1963; McDonald, 1963; Rankin, 1974). The fourth and seventh-grade results indicated that the adjusted reading speed of the learning disabled students did not result in reading flexibility if the criterion had included a specified level of adequate comprehension. A criterion of better than 80% accuracy in comprehension was only demonstrated at the tenth-grade level and occurred when the elapsed time for the group did

not change significantly between conditions. Therefore, if reading flexibility had been defined operationally for the investigation--specifying a degree of accuracy in comprehension--this learning disabled sample would not have met criterion for reading flexibility at any of the three grade levels. Further caution in describing the learning disabled group as flexible readers is also suggested by the low practical significance reflected by the difference between conditions which applied to both groups.

Reading Flexibility Across Grade Levels

The results of this investigation indicated varying degrees of maturation of reading skills across grade levels. Both groups at grade four demonstrated the ability to read passages to obtain information and locate specific facts. This level of maturation is consistent with the skill development expected for fourth-graders as described by Harris and Sipay (1978) and Lerner (1976). A distinct increase in reading speed was observed between fourth and seventh grades for both groups. However, minimal change in reading speed was noted between seventh and tenth grades for either group. Gibson and Levin (1975) suggested that as readers' skills mature a trend towards economy is exemplified by an increase in ability to locate relevant information and process the least amount of information needed. These data suggested that the majority of this maturation of reading skills occurs between grades four and seven, with minimal changes in reading speed or comprehension noted between grades seven and ten. A possible explanation for this peak in reading development at seventh grade was implied by Harris and Sipay (1978).

Their discussion of reading development elucidates the undesirable effects of removing formal reading instruction from school curricula after sixth grade.

Additional trends in reading development were indicated by the slope of regression lines across grades. (Tables 15 and 18 depict the regression lines and Tables 16, 17, 19, and 20 provide a summary of the regression.) These analyses suggested the tendency for the groups to vary reading speed and comprehension as the purpose for reading was manipulated; they also provided an indication of the development of reading flexibility for each group across grades. Although the normal students demonstrated reading flexibility at each of the three grade levels, there was no indication of improvement of this skill across grades. The learning disabled students did not demonstrate significant change in comprehension across grade levels; however, a trend was evident regarding the degree to which they varied speed according to reading purpose. Unfortunately, this trend indicated that, as the learning disabled group advanced in grades, they tended to become less

Insert Tables 15, 16, 17, 18, 19, and 20 about here

flexible, varying reading speed to a smaller degree. The trend toward lack of flexibility was observed from fourth to seventh grade, and finally at grade ten no evidence of flexibility was demonstrated for the learning disabled group. This lack of flexibility supports the contention for the grade level that poor readers are inflexible (Golinkoff, 1975-76; Spache, 1976). Further, the lack of development of efficient

sampling skills indicated that these students are not becoming more proficient at advanced grade levels (Goodman, 1976).

Although the slope of the regression line for normal students indicated no significant change across grades and the slope for the learning disabled students indicated a significant trend towards a reduction of flexibility, the two groups were not found to be significantly different from one another. This indicated that the normal students show no improvement in these skills over time and the degree to which they are characterized by reading flexibility is not significantly different from that of the learning disabled sample. This developmental pattern is contrary to the one predicted by Lerner (1976) and Harris and Sipay (1978). They predicted a maturation of efficient reading skills as the instructional emphasis changes at various grade levels. Goodman (1976) and Gibson and Levin (1975) observed that reading efficiency increase as students' reading skills mature. No implication was made that these skills improve as a function of age alone. These results suggested that flexible, efficient reading skills will not develop without systematic instruction.

An explanation of the developmental pattern of the learning disabled students supports the suggestion by Robinson (1979) that many poor readers are victims of reading instruction which emphasizes the mechanical aspects of reading. Hoffman (1979) also contended that most reading instruction teaches students that the fixed purpose for reading is accurate reconstruction of the author's meaning. The data of the learning disabled group suggested that this approach to reading instruc-

tion may be prevalent in the curricula of the schools selected for this student. As the learning disabled students spent more years in school, the difference in elapsed time got smaller while comprehension improved slightly. At fourth grade the learning disabled sample reduced their rate by 25 seconds and scored 73% on comprehension. In the seventh grade the students reduced elapsed time by 14.95 seconds and scored 78% on comprehension. Finally, at tenth grade the learning disabled students reduced their elapsed time by 2.38 seconds, and comprehension increased to 86% accuracy.

Implications for Reading Instruction

The marginal degree of reading flexibility demonstrated by the normal sample and the relative absence of reading flexibility in the learning disabled sample imply that both of these groups could profit from additional instruction addressing the components of reading flexibility. Specific implications from this study involve instructional aspects of reading speed and comprehension as well as the ability of students to vary reading speed and comprehension according to specific purposes for reading.

Reading speed should be given more attention in the reading curriculum for learning disabled students. Apparently an increase in reading speed is accompanied by an increase in comprehension. In addition to the desirable improvement in accuracy and understanding, this increase in reading speed should naturally result in more work being completed by students in less time. A problem often cited by regular teachers in working with learning disabled students is their inability to complete

assignments in a specified time period. With more attention to increasing the reading speed of learning disabled students, it may be possible to increase classroom productivity as more efficient reading skills are developed. Instruction should include training the students to select fewer cues and use the syntax and context cues in the reading material to predict outcomes without having to read each word. Students should also be assisted in organizing content in reading passages to aid in thier recall and to elicit faster reading speeds.

Present methods of teaching reading to these students should also be re-evaluated. Methods which emphasize the accurate decoding of each word and which focus on the utilization of letter and sound cues in the reading material may hinder the development of efficient reading skills. Apparently the attention to decoding words in print decreases the ability to attend to meaning. This word-by-word reading may eventually develop inflexible reading speeds. Teachers may wish to investigate methods which emphasize processing units of meaning according to the purpose for reading and consider teaching students to vary their rate of reading to achieve the assigned purpose efficiently. Students should be taught during beginning reading instruction that the goal is to develop efficient, flexible reading habits.

Methods for teaching reading should include strategies for refinement of reading skills. Teaching strategies should be systematically employed to train students to vary their reading speed according to the purpose established for reading. The criterion proposed by Fry (1978)--that efficient readers demonstrate a skimming speed twice as

fast as their average reading speed--seems to be a reasonable instructional goal for all students. As teachers instruct students to vary their reading speeds, comprehension must also be emphasized.

Adequate comprehension seldom requires that the student recall every detail of the passage. Generally a specific purpose could be assigned for reading tasks. The results indicating that reading comprehension improved when students were given a specific purpose for reading suggest that teachers should establish and clarify the purpose of reading assignments given to students. These purposes for reading should be varied systematically to give students experience in reading for a variety of different purposes. This training should include instructing students to ignore unimportant details and select the fewest, most important cues to accomplish their purpose for reading. In addition to recalling details, students should be given opportunities to practice making generalizations, drawing conclusions, and anticipating outcomes on the basis of reading portions of reading passages. Ultimately students should be taught to set their own purpose for reading and to consciously adopt a reading speed appropriate to attain their purpose most efficiently.

In summary, a major implication of this investigation is that school curricula for normal and learning disabled students are not adequately addressing the development of reading flexibility. The immediate implication of this study is that reading flexibility should be given more emphasis in the reading curriculum of all students, from the primary grades through high school. These skills should be introduced

in the beginning stages of reading instruction and be refined and reinforced at every grade level throughout schooling.

The results of this study have additional implications for teacher education programs. Teachers in both regular and special education should be trained to develop efficient, flexible reading skills critical to the academic success of their students. Reading instruction should not be omitted from the curriculum of secondary teacher education programs. At both primary and secondary levels, teachers should be required to demonstrate skill in specifying various purposes for reading, measuring the accuracy of the students' efficiency in varying their rate according to the assigned purpose for reading. Methods demonstrated to teach initial reading skills should not demand perfect word recognition and total comprehension from students. Recommended methods for teaching reading should include objectives and teaching strategies for the acquisition of independent, flexible reading skills.

Recommendations for Future Research

The implications of this study for future research are numerous. The most immediate recommendation is to replicate the study at each grade level. The results of such a study would be a more sensitive indication of any linear trend in the development of reading flexibility. The study should be repeated using the elapsed time measure and the same directions for establishing a change in purpose for reading. However, the instrument to measure reading comprehension should be revised to allow a broader range of individual scores and a more sensitive measure of variability among the groups. Again, fami-

liarity of the passages, passage length, and difficulty level of the material should be controlled.

Future research in reading flexibility should also include an operational definition of the skill. A minimum of 80% comprehension should be accepted as an adequate measure of accomplishing purpose. The degree to which reading speed should vary according to the different purposes for reading should also be specified. Fry's (1978) criterion of a skimming speed being two times as fast as average reading speed is recommended.

In addition to measuring the skill of reading flexibility, future research should identify correlates of adequate and inadequate reading flexibility. Behaviors such as lip reading, finger pointing, and eye movements should be observed as well as the academic behaviors. Reading methods used with the flexible and non-flexible readers should also be determined. The reading curriculum of the schools should be studied to determine if the specification of reading flexibility as an instructional goal is a positive correlate.

The student's ability to verbalize his ability to vary reading speed according to purpose should also be measured as a possible factor in training flexible readers. This verbal mediation approach, as well as the efficacy of other teaching procedures, should be investigated to identify methods with the highest probability of success in effectively training handicapped and non-handicapped students to develop these refined, efficient, flexible reading skills.

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Table 1

Descriptive Characteristics of the Sample by Grade Level

Grade 4 (40 Subjects)		
Group	No. Subjects	Sex
Learning Disabled	20	Male 14 Female 6
Normal	20	Male 14 Female 6
Grade 7 (40 Subjects)		
Group	No. Subjects	Sex
Learning Disabled	20	Male 15 Female 5
Normal	20	Male 15 Female 5
Grade 10 (40 Subjects)		
Group	No. Subjects	Sex
Learning Disabled	20	Male 14 Female 6
Normal	20	Male 14 Female 6
Total Subjects = 120		

Table 2

Descriptive Summary of the Two Experimental Conditions

	Condition I	Condition II
Stimulus	Reading passage presented on screen of Apple II Micro-Processor (22 lines, 176 five-character units).	Reading passage presented on screen of Apple II Micro-Processor (22 lines, 176 five-character units).
Directions	Read this story to answer a general comprehension question regarding its content.	Read this story to find out (specific question posed prior to reading and repeated after student reads story).
Student Response	(1) Reads passage silently. (2) Answers comprehension question requiring recall from story content.	(1) Reads passage silently. (2) Answers comprehension question requiring recall from story content.
Data Collected	(1) Elapsed time during silent reading task. (2) Student response from comprehension question.	(1) Elapsed time during silent reading task. (2) Student response from comprehension question.

TABLE 3

Analysis of Variance for Elapsed Time Data at Grade Four

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	35,161.66	1	35,161.66	17.30	.0002*
Students in Group	77,220.97	38	2,032.13		
Condition	8,628.69	1	8,628.69	21.65	.0001*
Group X Condition	386.06	1	386.06	.97	.3312
Within	15,143.10	38	398.50		
Total	136,540.47	79			

$\text{Eta}^2_{\text{Group}} = .26$

$\text{Eta}^2_{\text{Condition}} = .06$

TABLE 4

Means for Elapsed Time by Condition and Group for Grade Four

	Condition 1	Condition 2	Grand Mean
Normal	85.38	69.00	77.19
Learning Disabled	131.70	106.54	119.12
Grand Mean	108.54	87.77	

TABLE 5

Analysis of Variance for Comprehension Data at Grade Four

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	690.31	1	690.31	17.61	.0002*
Students in Group	1,489.58	38	39.20		
Condition	234.61	1	234.61	17.77	.0001*
Group X Condition	17.11	1	17.11	1.30	.2621
Within	501.78	38			
Total	2,933.39	79			

$$\text{Eta}^2_{\text{Group}} = .24$$

$$\text{Eta}^2_{\text{Condition}} = .08$$

TABLE 6

Means and Percentages for Comprehension
by Condition and Group for Grade Four (Range 0-30)

	Condition 1	Condition 2	Grand Mean
Normal	24.35 (82%)	28.70 (96%)	26.53
Learning Disabled	19.40 (65%)	21.90 (73%)	20.65
Grand Mean	21.88	25.30	

TABLE 7

Analysis of Variance for Elapsed Time Data for Grade Seven

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	51,085.83	1	51,085.83	35.18	.0001*
Students in Group	55,179.85	38	1,452.10		
Condition	6,929.99	1	6,929.99	21.08	.0001*
Group X Condition	269.16	1		.82	.37
Within	12,493.26	38			
Total	125,958.09	79			

$\text{Eta}^2_{\text{Group}} = .41$

$\text{Eta}^2_{\text{Condition}} = .06$

TABLE 8

Means for Elapsed Time by Condition and Group for Grade Seven

	Condition 1	Condition 2	Grand Mean
Normal	65.24	40.25	51.40
Learning Disabled	109.41	94.46	101.94
Grand Mean	85.98	67.36	

TABLE 9

Analysis of Variance for Comprehension Data for Grade Seven

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	127.51	1	127.51	3.53	.07
Students in Group	1,373.48	38	36.14		
Condition	2.11	1	2.11	.16	.69
Group X Condition	17.11	1	1.31	1.31	.26
Within	495.28	38	13.034		
Total	2,105.49	79			

TABLE 10

Means for Comprehension by Condition and Group
for Grade Seven (Range 0-30)

	Condition 1	Condition 2	Grand Mean
Normal	25.50 (85%)	26.75 (89%)	26.13
Learning Disabled	23.90 (80%)	23.30 (78%)	23.60
Grand Mean	24.70	25.03	

TABLE 11

Analysis of Variance for Elapsed Time Data for Grade Ten

Source	SS	df	MS	F	p
Group	(45,925.57)	1	(45,925.57)	28.53	.0001
Group at C ₁	18,798.73	1	18,798.73	28.44	.0001*
Group at C ₂	27,543.08	1	27,543.08	26.23	.0001*
Students in Group	61,163.29	38	1,609.56		
Condition	(963.83)	1	(963.83)	9.49	.0038
C at LD	56.64	1	56.64	.37	.55
C at Normal	1,323.42	1	1,323.42	25.95	.0001*
Group X Condition	416.24	1	416.24	4.10	.05*
Within	3,857.53	38			
Total	112,326.45	79			

$\text{Eta}^2_{\text{Group, Condition, and Interaction}} = .42$

$\text{Eta}^2_{\text{Group at C}_1} = .17$

$\text{Eta}^2_{\text{Group at C}_2} = .25$

$\text{Eta}^2_{\text{Condition at Normal}} = .01$

TABLE 12

Means for Elapsed Time by Condition and Group for Grade Ten

	Condition 1	Condition 2	Grand Mean
Normal	60.13	48.62	54.38
Learning Disabled	103.49	101.11	102.30
Grand Mean	81.81	74.87	

TABLE 13

Analysis of Variance for Comprehension Data for Grade Ten

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	82.01	1	82.01	3.92	.06
Students in Group	795.98	38			
Condition	277.51	1	277.51	15.72	.0003*
Group X Condition	56.11	1	56.11	3.18	.08
Within	670.88	38	17.65		
Total	1,882.49	79			

$\text{Eta}^2_{\text{Condition}} = .15$

TABLE 14

Means for Comprehension by Condition and Group
for Grade Ten (Range 0 - 30)

	Condition 1	Condition 2	Grand Mean
Normal	23.95 (80%)	29.35 (98%)	26.65
Learning Disabled	23.60 (79%)	25.65 (85%)	24.63
Grand Mean	23.78	27.50	

TABLE 15

Slope and Intercept of Learning Disabled and Normal
Regression Lines Using Difference in Elapsed Time (C_1-C_2)

Group	Intercept	Slope
Learning Disabled	40.75	-3.80
Normal	22.41	-.81

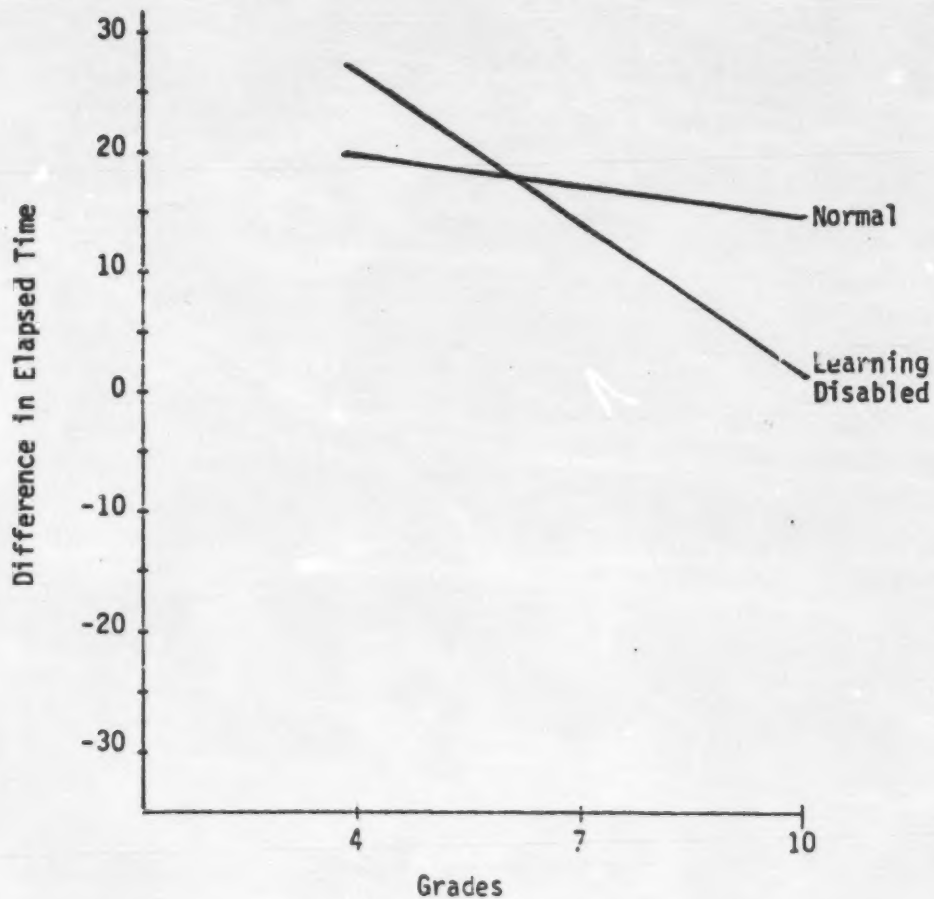


Figure 2. Regression lines for differences in elapsed time (C_1-C_2) for groups at three grade levels.

TABLE 16

Summary of the Regression of the Difference in Elapsed Time
Between Conditions 1 and 2 of Normal Students on Grade Level

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Grade	237.51	1	237.51	.75	.39
Within	18,459.97	58	318.28		
Total	18,697.48	59			

$$\underline{R}^2 = .01$$

TABLE 17

Summary of the Regression of the Difference
in Elapsed Time Between Conditions 1 and 2
of Learning Disabled Students on Grade Level

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Grade	5,191.33	1	5,191.33	6.62	.01*
Within	45,474.09	58	784.04		
Total	50,665.42	59			

$$\underline{R}^2 = .10$$

$$\underline{p} < .05$$

TABLE 18

Slope and Intercept of Learning Disabled and Normal
Regression Lines Using Difference in Comprehension ($C_1 - C_2$)

Group	Intercept	Slope
Learning Disabled	-1.84	.08
Normal	-2.44	-.18

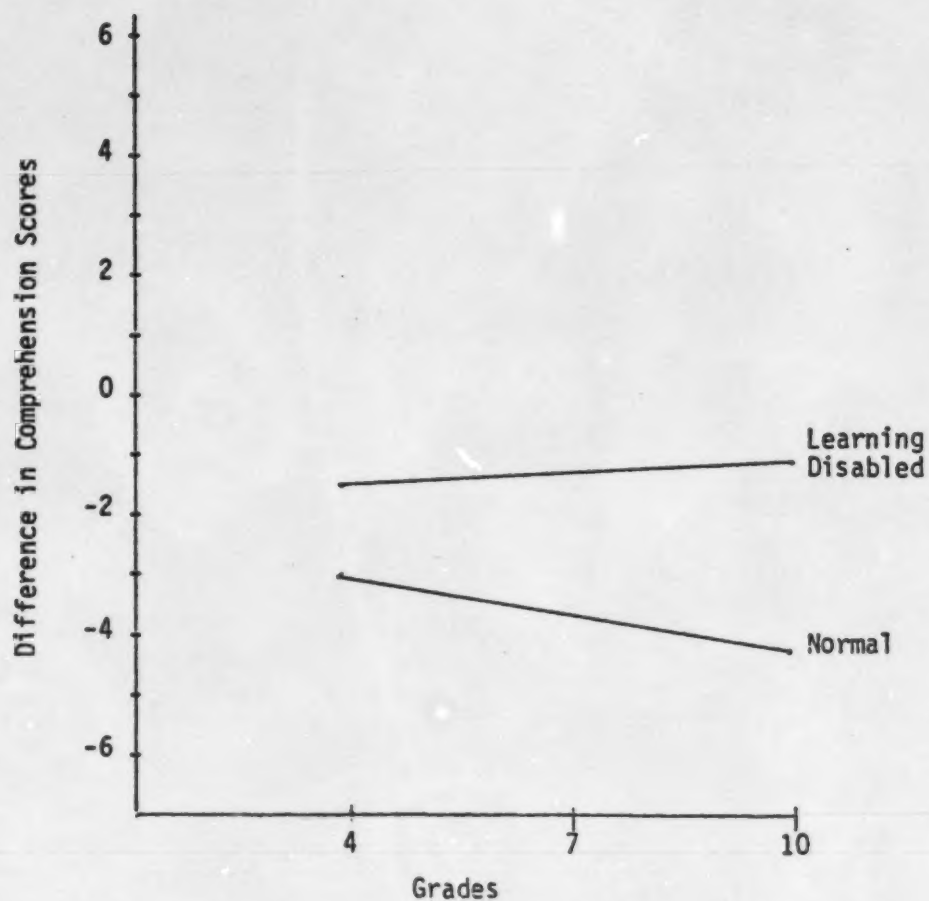


Figure 3. Regression lines for difference in comprehension scores ($C_1 - C_2$) for groups at three grade levels. (Note: A negative slope indicates a decrease in number of errors.)

TABLE 19

Summary of the Regression of the Difference
in Comprehension Scores Between Conditions 1 and 2
of Normal Students on Grade Level

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Grade	11.03	1	11.03	.38	.54
Within	1,704.31	58	29.38		
Total	1,715.34	59			

$R^2 = .006$

TABLE 20

Summary of the Regression of the Difference
in Comprehension Scores Between Conditions 1 and 2
of Learning Disabled Students on Grade Level

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Grade	2.03	1	2.03	.06	.81
Within	1,916.96	58	33.05		
Total	1,918.99	59			

$R^2 = .001$